Kaspar Valk Mikk-Kaspar Tammi Kairit Peekman

TARTU BUS TIMETABLE ANALYSIS



Introduction

Tartu launched new inner city bus routes in 01.07.2019. The timetables of the new routes were last changed in 01.09.2019. The goal of our project was to describe the situation of the new bus route timetables and find out whether or not they need changes.

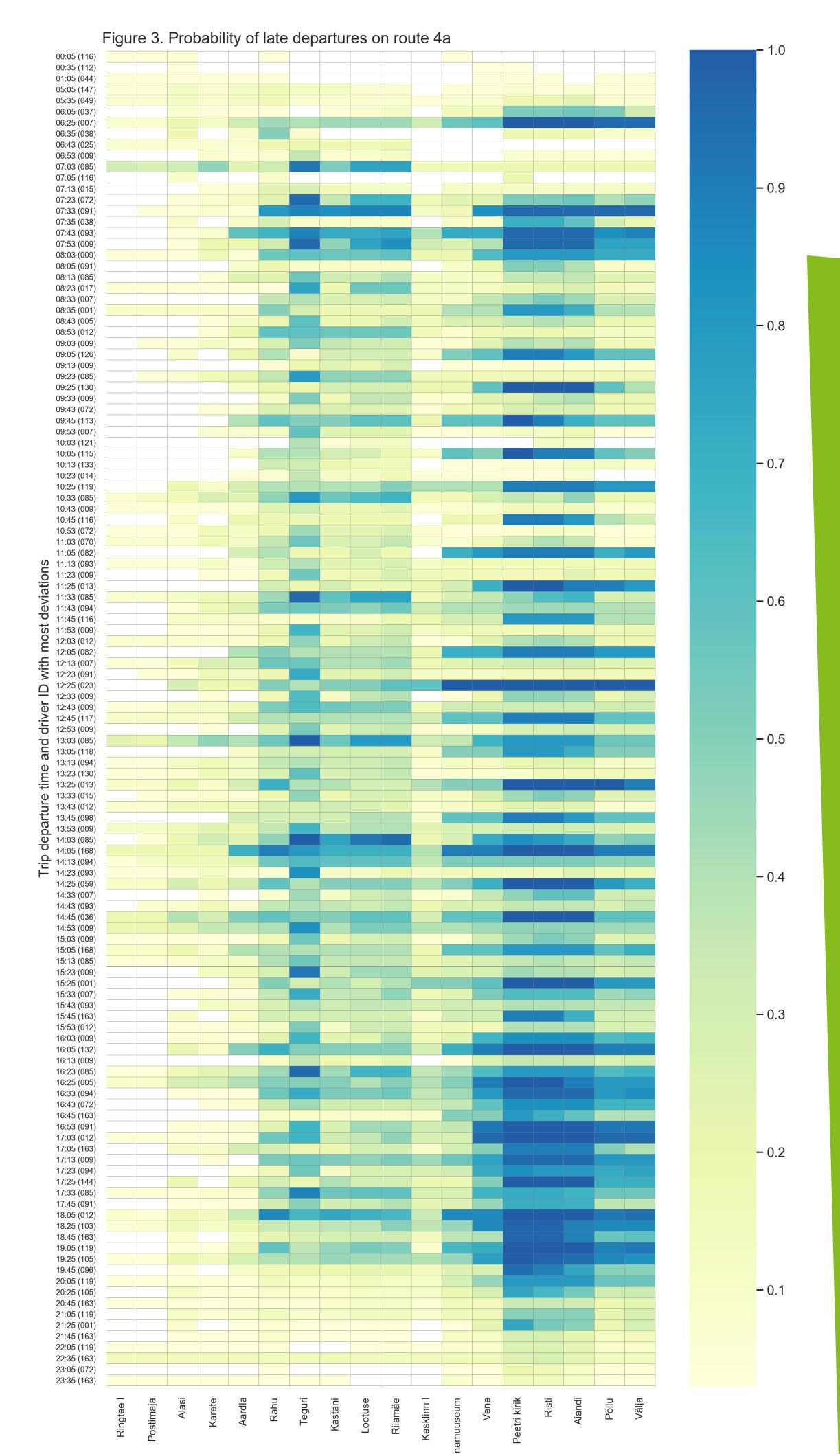
Data

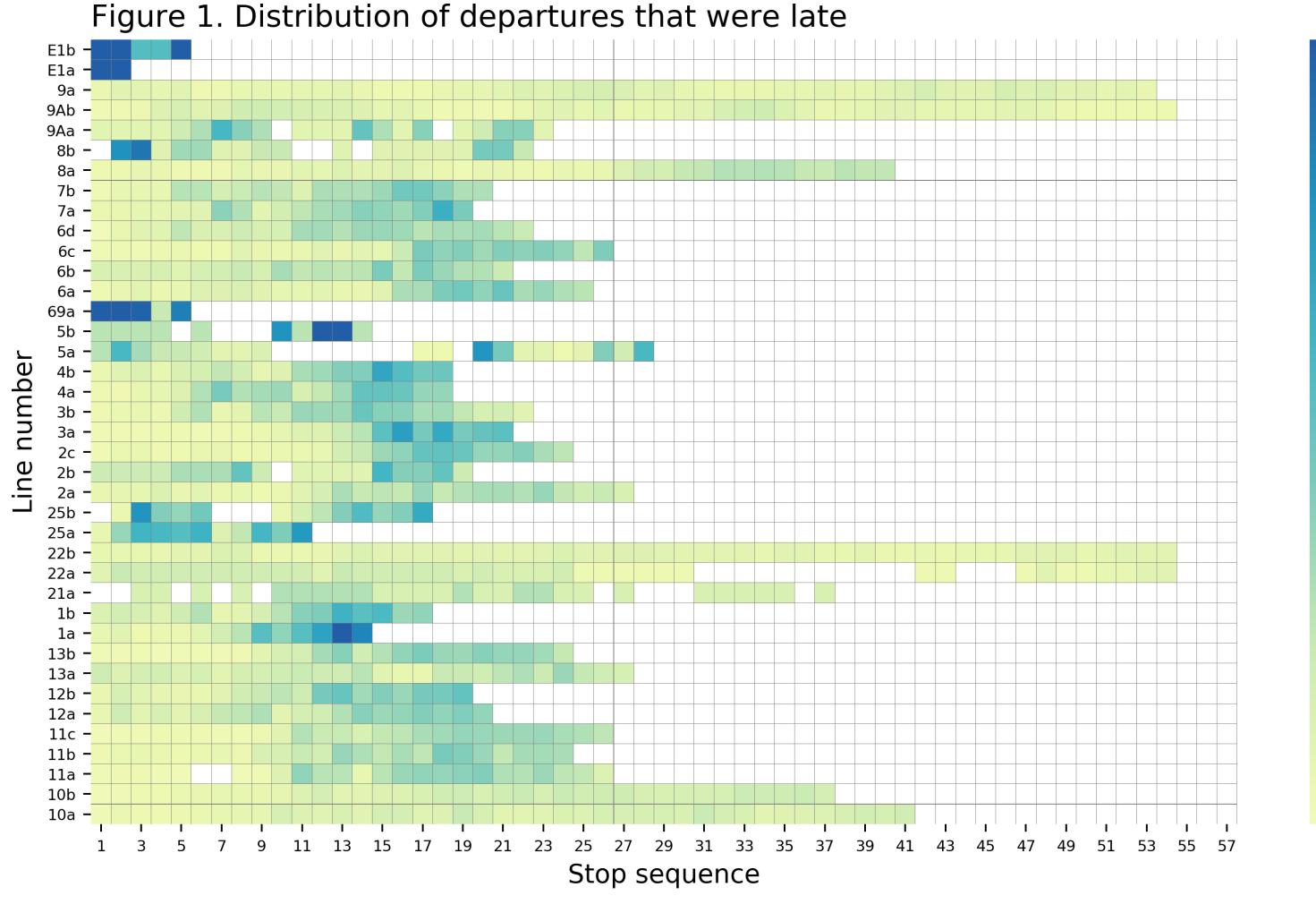
The analysis was done on private data provided by Tartu City Government and the data contained all the occasions from the time period 01.09.2019 - 18.10.2019 when a bus departed too late (3 mins later) or too early (10 seconds earlier) from a bus stop. The data contained 260000 occasions too late and 125000 occasions too early. During data preparation the first two weeks of data had to be deleted as the IDs of the trips in the recording system were changed with a significant delay. Otherwise the quality of the data was good.

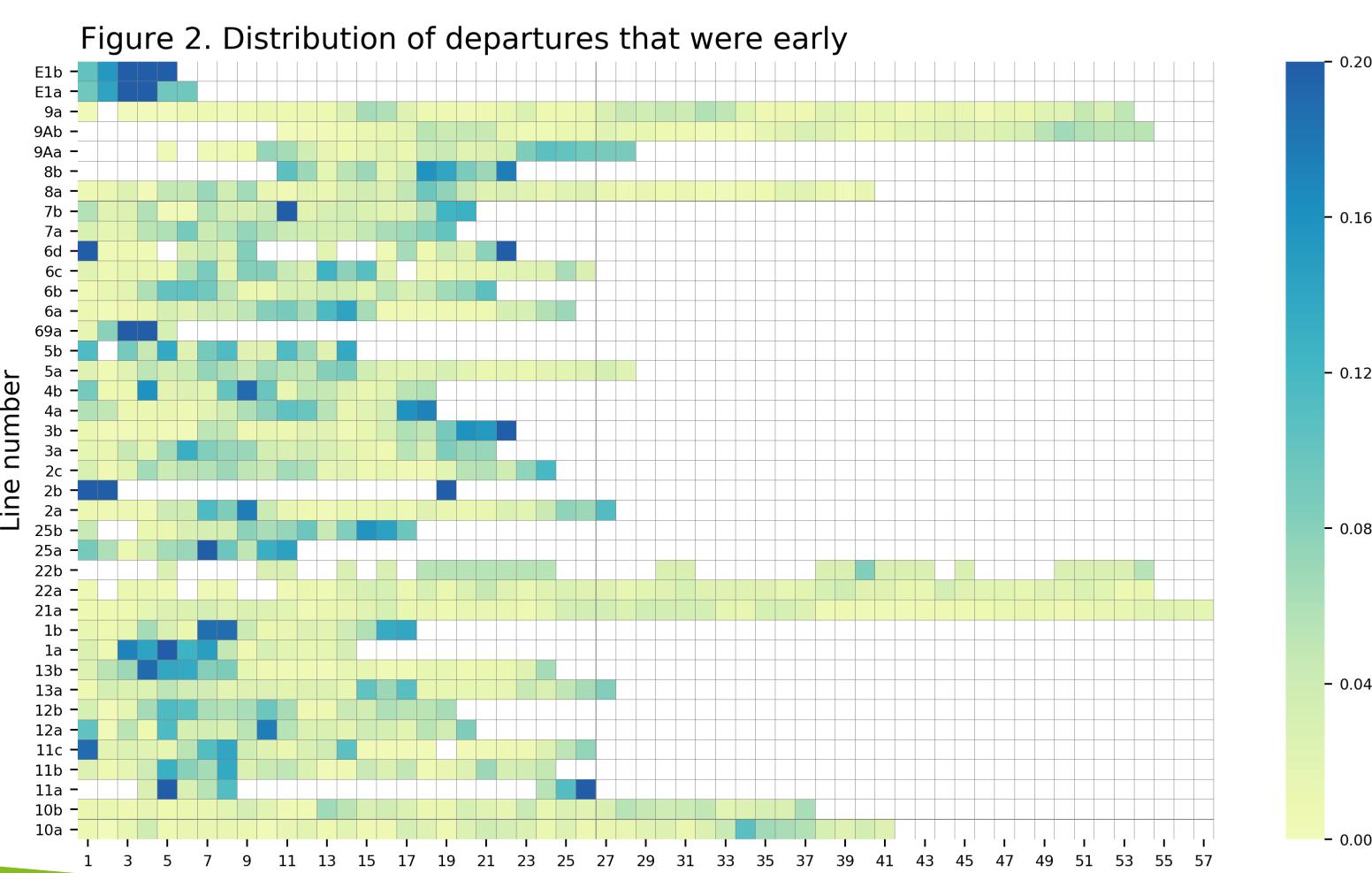
Terminology

Route/line - a fixed sequence of bus stops (for example "4 FI - Nõlvaku").

Trip - a route completion defined by the departure times and occurrences on weekdays (for example trip on route 4a starting at 05:05 every Monday-Friday).







Stop sequence

Results

- The probability of a problematic deviation was around 30% and it was slightly higher on workdays and lower of weekends.
- The stops with the most problematic deviations per day are Atlantis, Riiamäe (going out from city), and Lembitu, respectively each having on average 107, 88, and 76 deviations per day. This number is not taking into account the proportion of daily trips.
- Problematic situations the timetables exist but each of them has to be tackled separately as the cause of the problem could be rush hour traffic, the bus drivers driving style, a fault in the timetable, or a combination of them. For example in Figure 3 for route 4a the timetable might need some changes for Teguri stop as a late departure is quite common. However, in most of the trips where the stop is problematic, almost all the deviations are caused by the same drivers with IDs 085 and 009.

Conclusion

- The timetables need changes, however giving concrete recommendations for each bus stop in each trip in each route is a very time consuming task due to the high amount of routes and the individuality of each case and should be tackled with a larger project.
- Most departures that happen too late, happen in the last few stops of the trips as seen on Figure 1 and therefore are not as problematic.
- Occasional deviations in departure times from the timetables are normal.
 Pointing out problematic situations in the timetables depends largely on the definition of problematic.
- We will submit graphs similar to Figure 3 about every route to the Tartu City Government as they provide a good basis for improving the timetables and allow to see the problematic patterns for each route.

Source code

https://github.com/kaspar98/TartuBusProject